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The occasional cross.—When in 1876 I addressed the meeting of the American Association for the Advancement of Science at Detroit,¹ taking for my text what I then regarded as an extravagance, the exact language of a great teacher in science: “All plants with conspicuously colored flowers, or powerful odors, or honeyed secretions, are fertilized by insects; all with inconspicuous flowers, and especially such as have pendulous anthers, or incoherent pollen, are fertilized by the wind” I did not expect to see the proposition so widely modified as it is to-day. Our great leader, Asa Gray, wrote to me reiterating the strength of the position I was combating, and in the curt way quite allowable in the correspondence of friends whose regard for each other no difference of opinion could weaken, “dared” me to produce an instance of a flower as above characterized, that was not arranged for cross-fertilization. It was chiefly this “daring” that has led me in recent years to produce the instances. The broad view soon became modified so as to read that the plants were so arranged as to pollinate themselves in many instances when insects failed to do the work, and I doubt very much whether there is a prominent botanist to-day, who will deny that there are numerous instances in which sweet and colored flowers are so arranged that cross-fertilization is next to impossible. Indeed it has come to be quite frequent for authors on the relations between flowers and insects, when noting the contradictory facts to simply observe that an “occasional cross is not improbable.”

It may not be useless at this stage of the progress of thought to inquire, what is the physiological value of an “occasional cross”?

No one familiar with nature can fail to see that, of the millions of seeds annually produced by plants, an almost imperceptible fraction only come to seed bearing individuals, and the seeds from the “occasional cross” can scarcely have any record in the progressive history of the race. Suppose we take Mr. Robertson’s illustration of *Mollugo verticillata* (p. 274). I am satisfied that the “occasional cross” never occurs, and that “spontaneous self-pollination may take place” is putting the case with gratuitous mildness. A microscope would show that not only are the pollen-sacs disrupted and the pollen discharged over the pistil before the flower opens; but so long that the ovary has commenced to assume the brown tint of ripeness, and the seeds, with full cotyledons, have reached their full size. But suppose this not to be the case, what chance has an “occasional cross” to get the resultant seeds into the reproductive stage again? I have before me a single plant of less than average size. It is one-sided, and extends over half a circle with a twelve inch radius. I find in one seed vessel just 30

¹See Proc. Am. Ass. xxiv. p. 224.

seeds, and there have been already matured or on the road to maturity 372 seed vessels, with 11,160 seeds. How many of these would get through the long chapter of accidents and produce flowering plants next year? I venture to say not a hundred—possibly not ten. What chance has an “occasional cross” to benefit the race in a scheme like that proposed?

And then we find that those which get more than an “occasional cross” do not get along any better for it. Take Mr. Robertson’s illustrations again. *Gaura biennis* I believe to be more dependent on insect aid than he himself has discovered, though none of those he names have any hand whatever in it, while its close ally *Gaura parviflora* is just as absolute a self fertilizer. And if *Oenothera fruticosa* is so arranged that self-pollination is impossible—a fact of which I am by no means sure—how about its neighbor *Oenothera biennis*, which is one of the closest self-fertilizers in the whole family, and yet has made its way not only all over the American continent, but has invaded the old world as well!

I repeat, where does the physiological advantage of the “occasional cross” come in?—THOMAS MEEHAN, *Germantown, Philadelphia*.

Sullivantia Hapemaii.—In the November GAZETTE (p. 348), owing to undue haste in printing, this species appeared as a *Heuchera*. The oversight was unfortunate, but it is to be hoped that the correction can overtake the blunder. It is a matter of some interest to discover in our flora a third species of *Sullivantia*, and that, too, with range intermediate between that of the other two. *S. Ohionis* of the north central states (Ohio to Iowa and Minnesota) has always been considered a rare and interesting plant; and *S. Oregana* of the Willamette and Columbia Rivers still more so. This third species, from the Big Horn Mountains of Wyoming, well preserves the generic appearance, and would be recognized at a glance by those familiar with the other species, although much more closely related to its eastern congener, a thing to be expected. All three species affect the same situation; all being found growing in the crevices of dripping cliffs. In addition to the description in the November GAZETTE it may be added that the calyx-lobes are 3-nerved and bright green; the petals are obovate, entire, and brown at base; and the pod is broad and depressed at the partition. The species somewhat resembles *S. Ohionis*, but its lower habit, smaller and deeply cut leaves (the lobes acutely dentate), green and 3-nerved calyx-lobes, much broader obovate (not oblanceolate acutish) petals, and its broad and depressed pod make it very distinct.—JOHN M. COULTER, *Bloomington, Ind.*